

Management Review Study of Hampton Roads District

for the Virginia Department of Transportation

Executive Summary

Deloitte & Touche LLP

August 6, 2004

FINAL



Objective, Scope and Methodology

Objective:

- **VDOT engaged Deloitte to perform a management assessment of the Hampton Roads District, focusing on its administration of the Construction Program and the detailed management of Construction Projects**

Scope:

- **Assessment of the management of the Construction Program at the District level and execution of Construction Projects at field level**
- **Examination of the relationship between the Construction Program and the Preliminary Engineering, Design, Maintenance, Operations, ROW, Utilities and other District functions**

Methodology:

- **Interviewed in excess of 60 individuals from Central Office, Hampton Roads, NOVA and Richmond Districts, FHWA, A/E Firms, Contractors and Local Officials**
- **Analyzed Department, District and Project documents and data sources**
- **Assessed field operations at several active construction project sites**
- **Documented key observations and developed recommendations for improvement**
- **Provided suggested plan for implementing recommendations**

Evaluation Focus

Deloitte evaluated the Hampton Roads District in the context of the Department's key initiatives and priorities:

1. Distributed Authority

- **Placement of responsibility and accountability for decision making at the most appropriate location within the organization**

2. Project Management

- **Implementation of a cohesive and comprehensive project management process to establish accountability for construction projects, ensuring on-time, on-budget and high quality delivery**

3. Concurrent Engineering

- **Increased involvement of all stakeholders in project life-cycle, with goal of improving project coordination and communication, and ultimately improving quality of design-construction process**

Focus of the study was to evaluate the Hampton Roads District's organization, processes, programs and systems to support and implement these initiatives within the Construction program.

Hampton Roads District Construction Program Summary

Program Highlights:

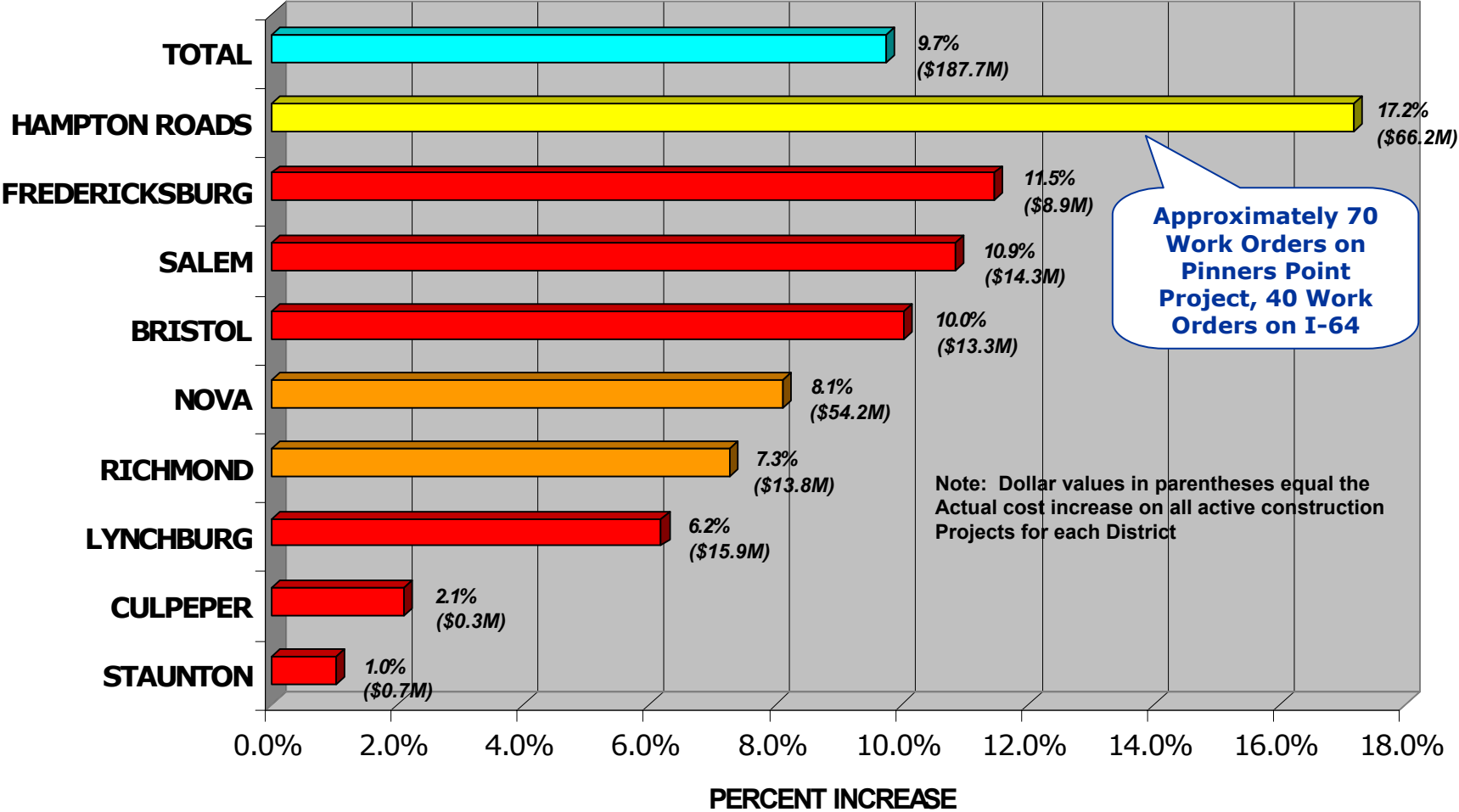
- **Second largest Construction Program in the State (\$555M since FY00; NOVA largest at \$989M)**
- **Largest Urban construction program in the State (\$286M since FY00; NOVA next largest at \$41M)**
- **Six Year Improvement Plan (SYIP) includes \$1.4B for Hampton Roads for all Maintenance and Construction activities through FY10**

Program Performance:

- **Hampton Roads has highest increase in cost when comparing final construction cost to awarded amount (24.2% average increase since FY00, 17.2% on active projects)**
- **Hampton Roads has the highest dollar value and the second highest number of work orders in comparison to other Districts (695 total Work Orders at a cost of \$44.2M for all projects initiated since FY00)**
- **In comparison to the other large Districts (NOVA, Richmond), Hampton Roads has the most significant schedule slippage when comparing forecasted versus original completion dates**
- **Quality performance rating has been on par with other Districts, with increased attention required in correcting previously identified non-compliance issues**

Cost Performance – Active Projects

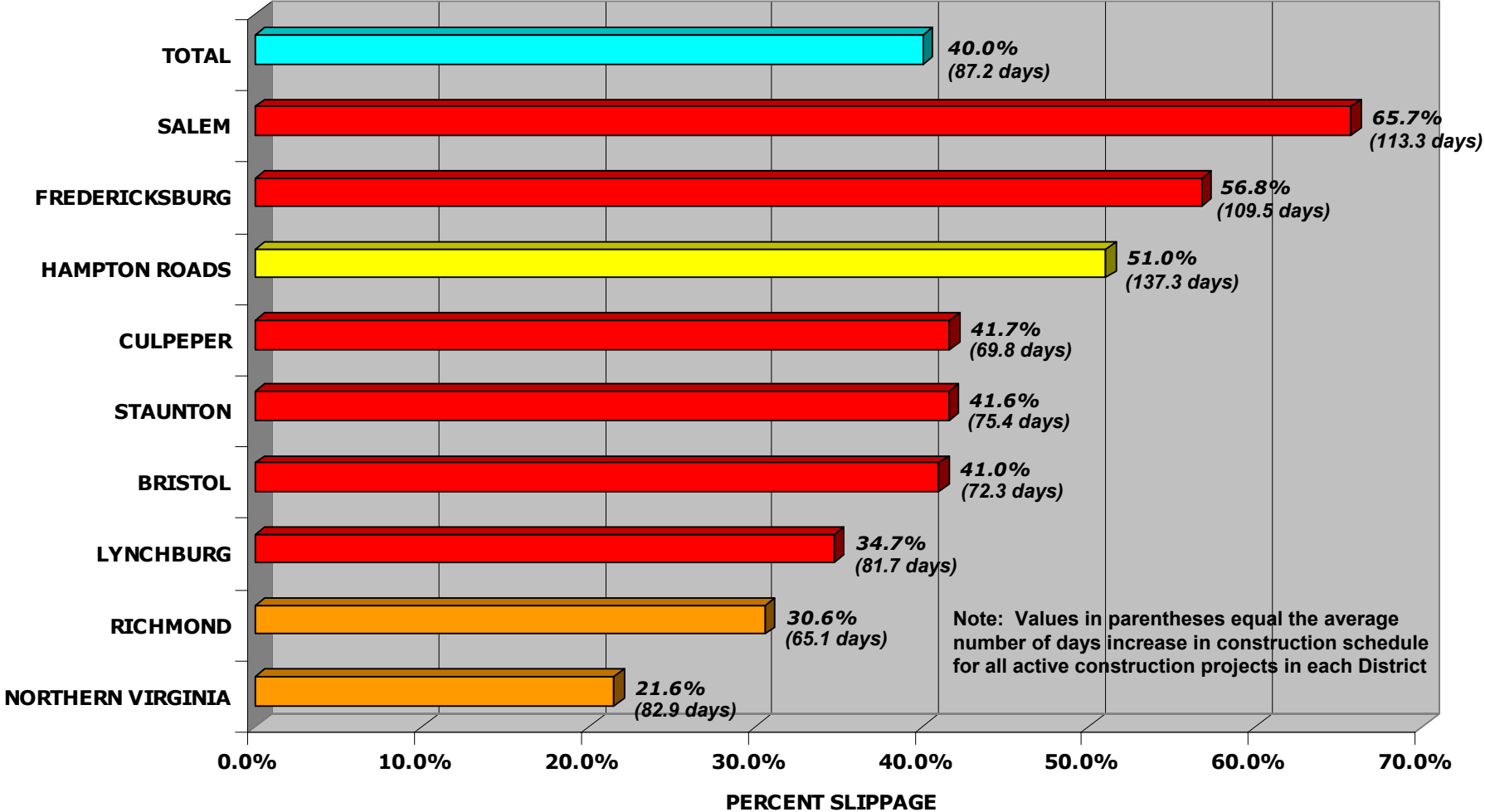
Contract Amount - Current Versus Awarded



Data obtained from VDOT Project Dashboard on 4/27/04 represents Current Contract Value of all Active Projects versus the original Awarded Amounts.

Schedule Performance - FY00 thru FY04

Completion Date – Approved versus Original



Data obtained from VDOT Data Warehouse on 4/30/04 represents Current Approved Completion date versus Original Completion Date for all Projects (FY00 through 4/30/04).

Observations and Recommendations

The following pages summarize the major issues identified by Deloitte during the course of the Study, and the recommendations developed to address these issues. Detailed observations and recommendations are included in the body of the report. The major issues identified and evaluated include:

Program Issues:

- Organization
- Project Management
- Ownership/Accountability
- Communication
- Work Order/Claims Resolution
- Scheduling/Estimating
- Management Reporting
- Human Resources

Project Issues:

- Design Constructability Review
- Construction Inspection
- Project Documentation
- Quality Control
- Project-Level Staffing
- Contractor Evaluation Process

While the scope of this Study was the Hampton Roads District Construction program, a number of the proposed recommendations can be implemented at a Statewide level. Such recommendations will be noted as “(SW)”.

Observations and Recommendations (cont'd)

I. Organization

Observations:

1. **Conflicting lines of authority and responsibility**
 - a. **Conflicts between Resident Engineers and District Construction Engineer over construction-related decisions**
2. **District Administrator has 13 direct reports, which is excessive and inefficient**
3. **Cradle-to-grave project management approach has not been effectively implemented**
 - a. **Currently a distinct hand-off from Design to Construction**
 - b. **District resources are functional-minded, not project-focused**
4. **Fragmented cost and schedule control and reporting functions**

Recommendations:

Deloitte developed and evaluated several alternative organizational structures to accommodate the Department's initiatives, and recommends a matrix structure incorporating the following changes:

1. **Shift construction authority from Resident Engineers (now called Transportation Managers) to Project Managers and Area Construction Engineers (SW)**
2. **Streamline District Administrator reporting to 7 direct reports**
3. **Establish Project Management Office to centralize and increase focus on management of projects (SW)**
4. **Establish Project Controls group to centralize and increase focus on scheduling, cost estimating, contract administration (i.e. scope control) and management reporting (SW)**

Observations and Recommendations (cont'd)

I. Organization (cont'd)

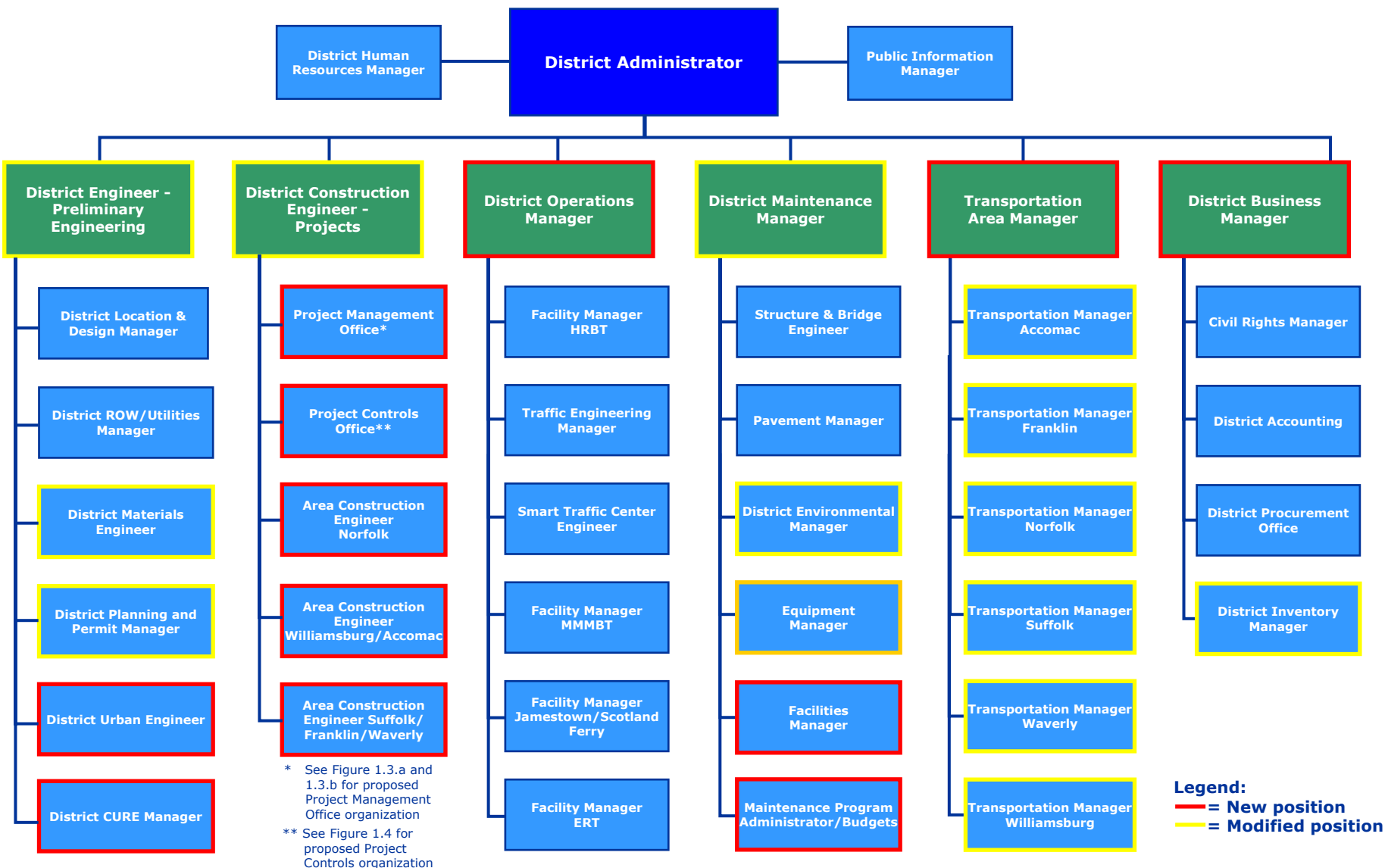
Observations:

5. No dedicated resource in the District to focus on constructability and bidability of designs
6. Need for a dedicated resource to focus on Urban program
 - a. 52% of total Hampton Roads construction program is for Urban roads
7. Operations and Maintenance function is overburdened from an oversight perspective
8. Need for a more proactive public relations program within the District

Recommendations:

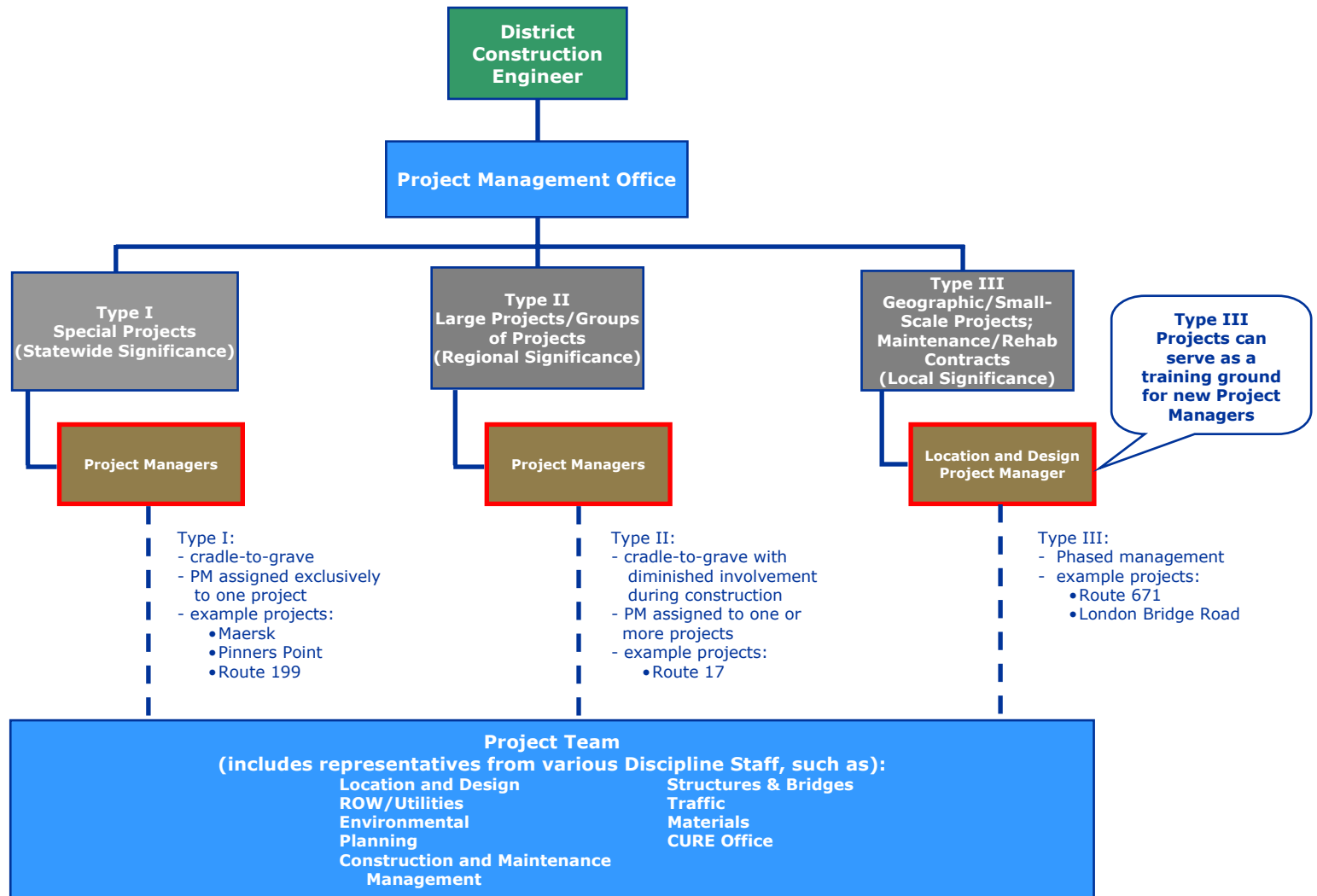
5. Establish a CURE office under the District Engineer for Preliminary Engineering to implement the a constructability and design review process similar to that being used successfully by NOVA (SW)
6. Add an Urban Engineer position under the District Engineer for Preliminary Engineering to provide increased focus on the establishment and implementation of the Urban program
7. Separate Operations and Maintenance functions and add District Operations Manager role
 - a. Increases oversight and administration of these two significant District functions
8. Public Information function to be staffed and to report directly to District Administrator

Proposed Organization Chart



Note: Position titles are for illustration purposes only and are subject to revision.

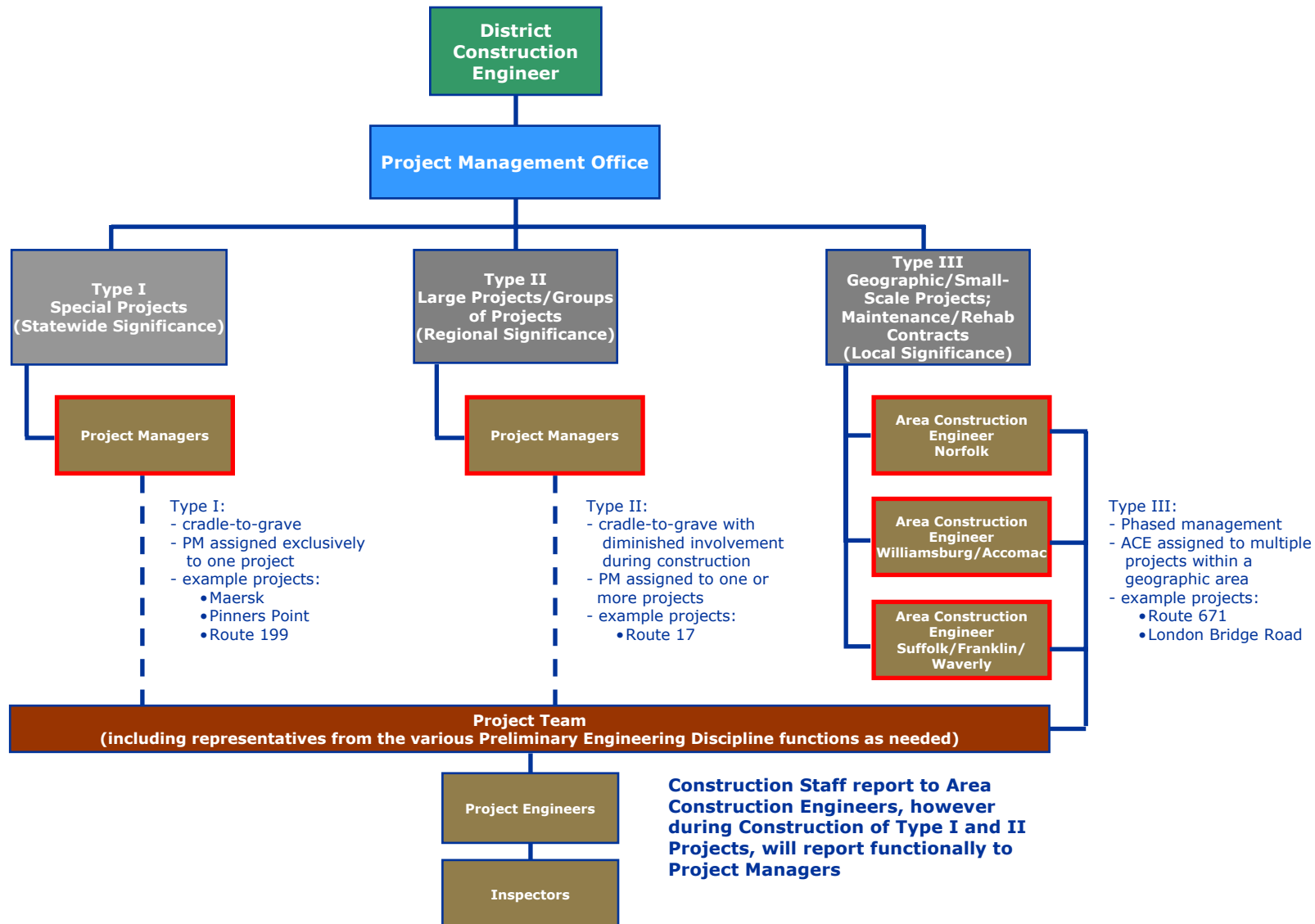
Proposed Project Management Office During Design



Discipline Staff report to District Engineer for Preliminary Engineering, however during Design of Type I and II Projects, will report functionally to Project Managers and during Construction of Type III projects, will report functionally to Area Construction Engineers, as needed.

Note: Position titles are for illustration purposes only and are subject to revision.

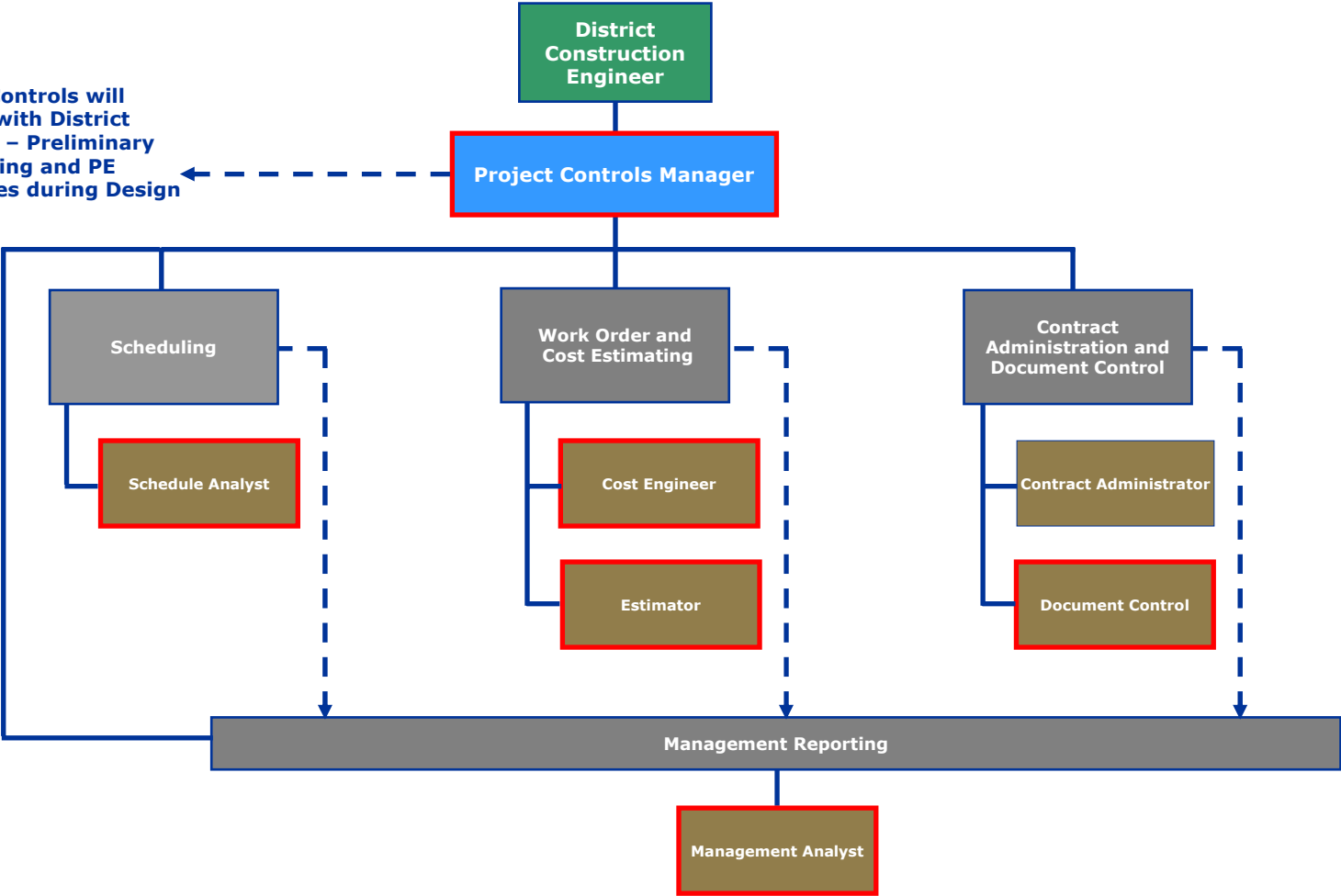
Proposed Project Management Office During Construction



Note: Position titles are for illustration purposes only and are subject to revision.

Proposed Project Controls Group

Project Controls will interact with District Engineer – Preliminary Engineering and PE Disciplines during Design



Note: Position titles are for illustration purposes only and are subject to revision.

Organization Implementation Plan

- 1. Establish Statewide Organization Committee comprised of the Chief Engineer, Chief of Systems Operations, Chief of Organizational Development, Inspector General and Chairman of DAC (District Administration Council) to evaluate the proposed organizational modifications and determine components which can be implemented Statewide**
- 2. Establish Steering Committee at the Department level consisting of the Chief Engineer and representatives of the existing functions within the Department's Preliminary Engineering and Construction Programs to oversee implementation of the proposed Departmental organization modifications. Outside consultant will support and advise the Steering Committee during implementation.**
- 3. Establish Steering Committee at the District level consisting of the District Administrator, Assistant District Administrator (temporary position), L&D Manager, District Engineer for Preliminary Engineering, District Construction Engineer for Projects and Human Resources Manager to oversee implementation of the proposed District organization modifications. Outside Consultant will support and advise the Steering Committee during implementation.**
- 4. Develop phased approach to implementing proposed organizational change**
 - a. Develop overall phased implementation plan**
 - b. Identify and assign necessary resources to develop detailed phased approach at the function level to account for all aspects of the restructuring, including Human Resources, Logistical, Technical and Training issues**
- 5. Prepare and implement a detailed Communications plan to keep all affected parties informed throughout the implementation process**

Observations and Recommendations (cont'd)

II. Project Management

Observations:

1. Project Management vision at the Central Office is on target
 - a. VDOT recently recognized at Project Management National Study Results Conference (hosted by FDOT) as leader in the field of Project Management
 - b. Project Management activities being controlled at Central Office as opposed to District
2. Draft Project Management Policies and Procedures Manual developed by Central Office is strategic rather than tactical
 - a. Policies and procedures should reference all Construction Directives and Instructional and Informational Memoranda and should be presented in similar level of detail

Recommendations:

1. Create framework and gather required resources to implement Project Management concept at Central Office and District level:
 - a. Establish Project Management Office in Central Office to develop policies and procedures, oversee and assist District project management, evaluate workload and make resource recommendations for project staffing and to document and distribute best practices information. Reports to Chief Engineer for Program Development (SW)
 - b. Establish Project Management Office at District level to implement cohesive and comprehensive project management process (SW)
 - c. Continue current Statewide initiative to add 50 licensed Professional Engineers; utilizing some of the new hires as Project Managers (SW)
2. Work with Central Office PM group to enhance Project Policies and Procedures Manual to reflect intended PM approach at District (SW)

Observations and Recommendations (cont'd)

II. Project Management (cont'd)

Observations:

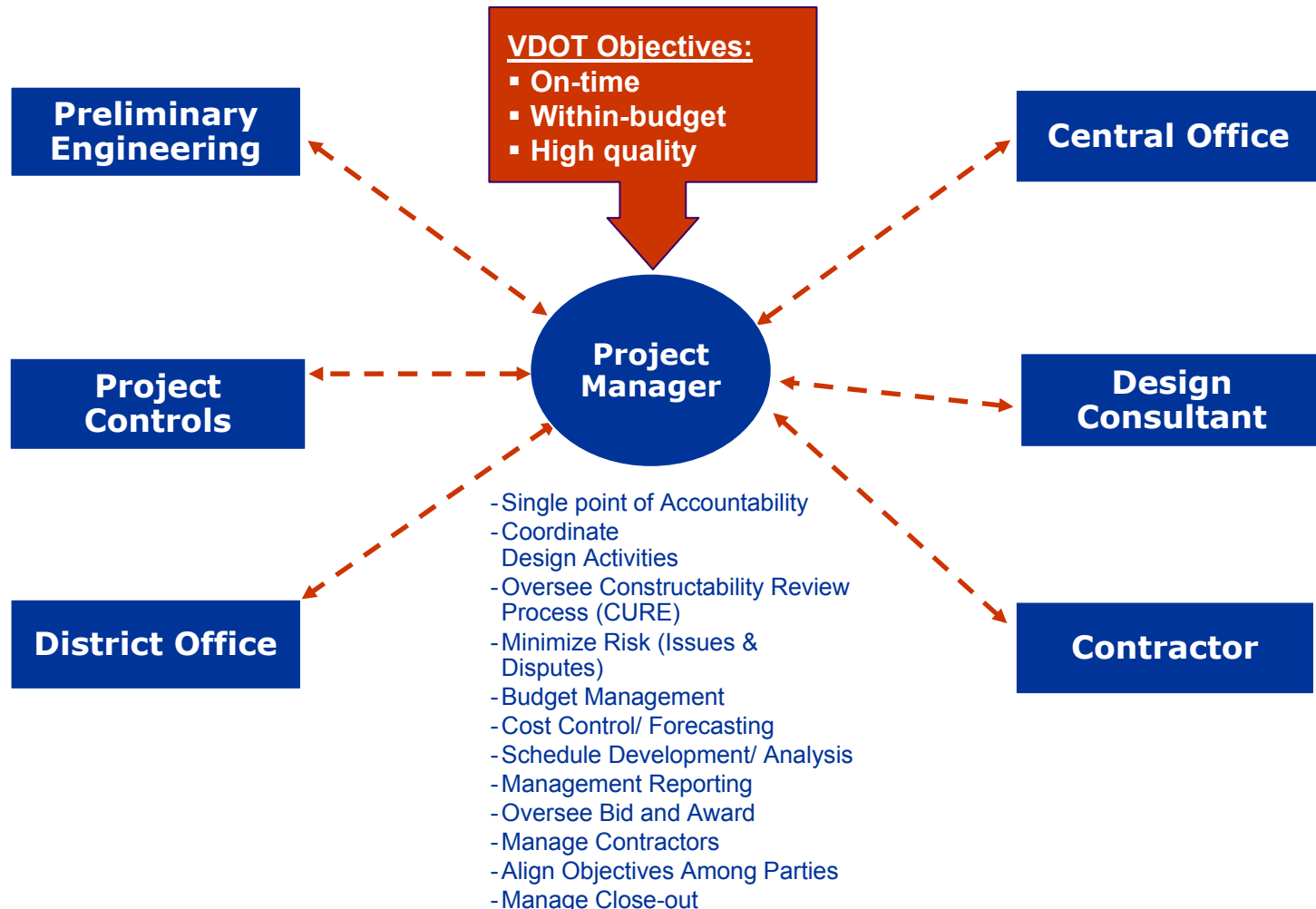
3. **Project Dashboard utilized by District and Residency management as main source for overseeing cost and schedule performance of Projects**
 - a. **System is informative and useful, however other information outside of Dashboard is needed to manage Projects**
 - b. **These additional management metrics should not be part of the Project Dashboard**

Recommendations:

3. **Project Controls group to work with District management to establish and implement a more robust and timely project management reporting system (SW)**
 - a. **System should have forecasting and estimating capabilities to allow the Project Manager to understand cost and schedule impacts of decisions on a real-time basis**
 - b. **System should have added performance metrics above and beyond the metrics included in the Dashboard (i.e. work order value as a percent of construction value; contingency utilization, etc.)**

Project Manager Roles, Responsibilities and Relationships

The Project Manager will be the single point of project accountability, but will be supported by other functions through a project-focused matrix-style organization within the Hampton Roads District.



Project Management Implementation Plan

- 1. Establish Project Management Office at Central Office to oversee and administer Project Management at the Districts, to establish policies and procedures, to evaluate workload and make resource recommendations for project staffing and to document and distribute best practices information**
 - a. Reports to the Chief Engineer for Program Development**
- 2. Create Project Management Office (PMO) at District level as defined in Issue No. 1 – Organization**
 - a. Reports to District Construction Engineer, who will be responsible for assigning Project Managers to Projects and for determining required staffing support**
- 3. Customize and distribute draft Project Management Manual for Hampton Roads to reflect revised organizational structure and to encompass the activities required under “cradle-to-grave” project management**
- 4. Modify current Project Management Training program to reflect roles and responsibilities under revised organizational structure and to facilitate adoption of the revised PM Manual**
- 6. Enhance current reporting system to enable Project Managers to better administer their Projects**
- 7. Develop Project Manager Employee Work Profiles and Performance Evaluation reports to identify expectations of the Project Manager and to establish criteria by which a Project Manager’s performance will be evaluated**

Observations and Recommendations (cont'd)

III. Ownership/Accountability

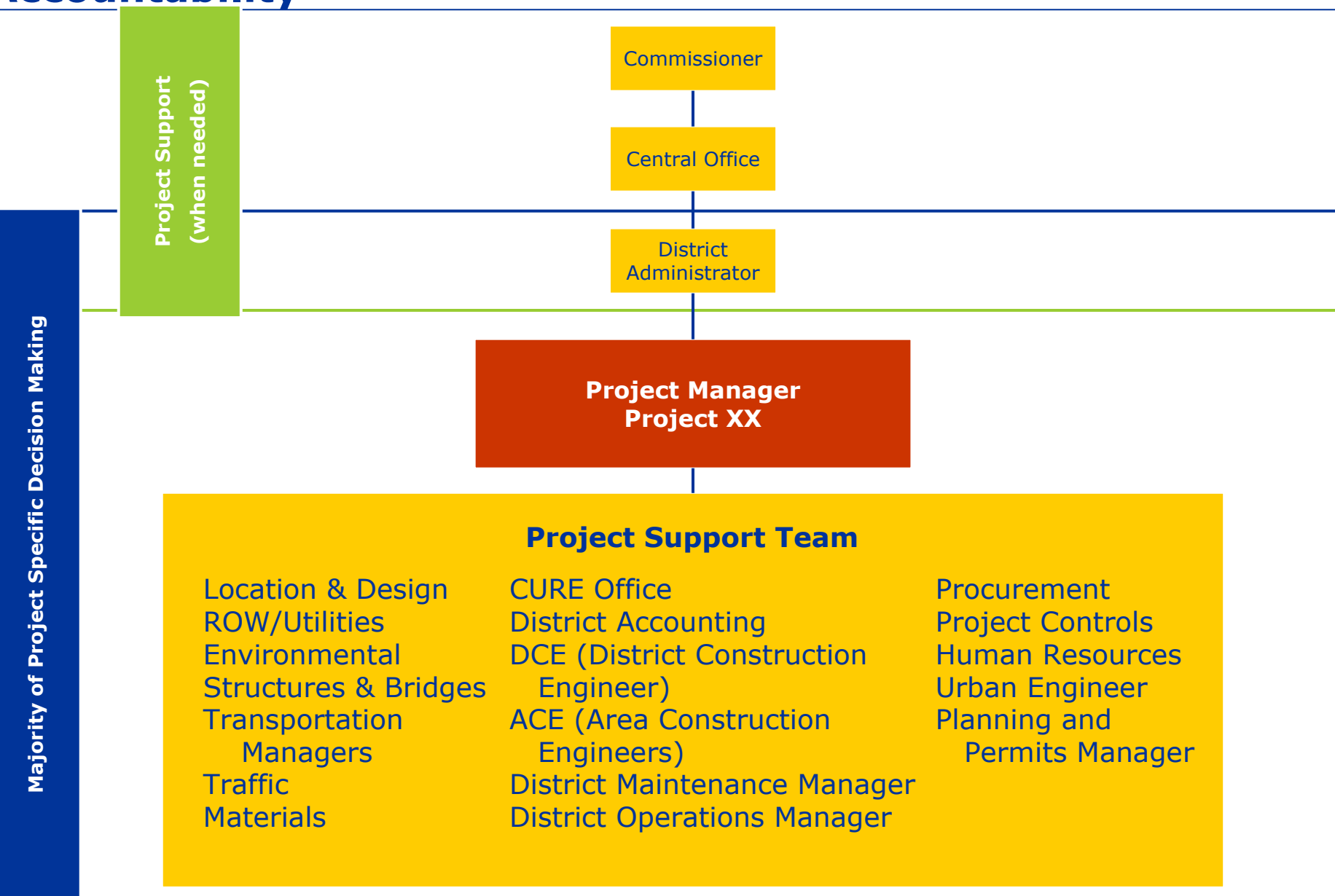
Observations:

1. **Distributed Authority concept not fully implemented in the Hampton Roads District**
 - a. **Design authority and accountability currently assigned to L&D Project Manager**
 - b. **Construction authority and accountability currently assigned to Resident Engineers, who are also responsible for Maintenance programs and communication with local officials**
2. **A strong culture of teamwork and ownership needs to be created**

Recommendations:

1. **Develop a Distributed Authority plan for the District, clearly identifying roles and responsibilities, authorization levels and decision criteria (SW)**
 - a. **Reflect shift of authority and accountability for project performance from L&D Project Manager and Resident Engineer (now called Transportation Manager) to designated Project Manager and Area Construction Engineer**
2. **Establish performance measurement criteria to evaluate staff according to their ownership levels (SW)**
3. **Develop specific initiatives to encourage teamwork, ownership and decision-making, consistent with the proposed organizational modifications and project management concept (SW)**

Distributed Authority and Levels of Project Specific Accountability



Observations and Recommendations (cont'd)

IV. Communication

Observations:

1. Instances of field staff receiving direction from more than one superior
2. Channels of communication not always open between Residency and District staff
3. Communication between District and localities lacking
4. Resolution of Work Orders and Claims not always communicated to all affected parties
5. Responsible field management (Resident Engineers, Project Engineers) not always present in field
6. Partnering on major projects appears to be working well
7. No formal communication structure between District and FHWA

Recommendations:

1. Establish clear lines of reporting (refer to Organization recommendations)
2. Establish requirements to keep all affected parties informed of decisions
3. Establish periodic meetings between District Administrator, Transportation Managers and Local Officials
4. Establish "lessons learned" regarding Work Order and Claims resolution (SW)
5. Establish criteria for amount of time construction staff are required to be on site (SW)
6. Continue to encourage partnering at project level
7. Establish formal communication between District Administrator and FHWA

Observations and Recommendations (cont'd)

V. Design/Constructability Review

Observations:

1. Concurrent engineering process not fully implemented at District level
 - a. Construction personnel not consistently involved in constructability reviews during design; maintenance staff not involved in reviews
2. Design changes continuing after ROW negotiations have been finalized, costing the District money

Recommendations:

1. Establish dedicated constructability and bidability review function similar to NOVA's CURE concept (SW)
 - a. Project Manager to oversee constructability review process and ensure that all relevant parties are involved
2. Ensure design is substantially complete prior to concluding ROW negotiations
 - a. Ensure that Project Schedule includes sufficient time to complete constructability reviews at each milestone

PM Introduction into Concurrent Engineering Process

PROJECT
REVIEW
BOARD

DISTRICT
ADMINISTRATOR

CE
DPE

PROJECT
MANAGER

FUNCTIONAL
MANAGERS

PROJECT
TEAM

Project
Authorized

State L&D
Engineer to
Review
SYIP to
Determine
Required
P.M.
Skillset

Review
Available
PM
Candidates

Is
Candidate
Certified

Recommend
/Approve
Candidate

Notify P.M.
Notification
to Indicate:
Delivery
Type, PM
Approach,
Org
Structure

Establish
Project
Charter &
Project
Manager
Performance
Metrics

PM Candidate
Obtains
Certification

Review/
Determine
Team
Members,
Team
Organization,
Team
Commitment
Requirements

Notify
Project
Team
Members

Finalize
Initial
Schedule
& P.E.
Budget

Request
/Ensure
Funding

Establish
Thresholds
For Project
Team
Performance

Establish
Project
Tracking
System
(MPIS)

To
Scoping

**Note: Project Manager Certification
requirement to be implemented
as a future effort**

**Note: Project Manager is
responsible for
overseeing the
Concurrent Engineering
Process during Design**

Develop Initial
Schedule &
Initial Budget for
Each Function

Observations and Recommendations (cont'd)

VI. Work Order/Claim Resolution

Observations:

1. Field personnel not consistently involved in Work Order/Claim resolution process
2. Independent review of contractor Work Order cost proposal at District level not required
3. Lengthy Work Order approval process
4. Need to improve completeness and accuracy of work order data in the Data Warehouse
5. Lack of consistency in categorizing Work Orders by cause
 - a. Broad definitions with regard to type of cause
 - b. Too many categories

Recommendations:

1. Include Project Inspectors in the Work Order review process (SW)
2. Establish a "lessons learned" database to minimize recurrence of Work Orders (SW)
3. Require preparation of independent estimate by District staff for all Work Orders in excess of \$50K
4. Require work order approving parties to follow timetables established in CD-2004-01
5. Construction Division should establish clear guidelines and criteria regarding categorization of Work Orders by cause (SW)
 - a. Consolidate category list
 - b. Eliminate "Miscellaneous" category
 - c. Train Project Managers, Project Engineers and Inspectors on definitions and application of Work Order causes

Observations and Recommendations (cont'd)

VI. Work Order/Claim Resolution (cont'd)

Observations:

6. Need for improved Work Order analysis to identify items such as trends in causes, corrective actions taken, etc.

Recommendations:

6. Delegate responsibility to Project Control Office for monitoring accuracy and completeness of Work Order data and for analyzing Work Orders (SW)

Observations and Recommendations (cont'd)

VII. Scheduling/Estimating

Observations:

1. A lack of consistency in the Scheduling and Estimating functions performed by various District staff
2. Some construction personnel interviewed were not knowledgeable about CPM scheduling
3. Calendar day schedules being utilized
4. Some contract specifications and special provisions for scheduling not being enforced
5. Schedule performance based on paid-to-date, not physical progress
6. High level estimates prepared for SYIP; often deviate from detailed estimate

Recommendations:

1. Establish Scheduling and Estimating functions within the Project Controls Office to centralize and standardize the District's scheduling process (SW)
2. Develop CPM training for construction personnel (SW)
3. Move from calendar day to fixed end date schedules to ensure better control over Project Schedules (SW)
4. Enforce established scheduling specifications and special provisions
5. Consider alternate criteria to measure schedule performance (i.e. earned value) (SW)
6. Monitor actual project cost versus PCES estimate (SW)

Observations and Recommendations (cont'd)

VIII. Human Resources

Observations:

1. Training and education opportunities available; participation not widespread or mandatory
2. Performance versus accountability not evident with regard to evaluation/compensation
3. Flexible compensation tools exist in State; not utilized
4. Insufficient number of titles within the Inspector program to reflect varying levels of experience
5. Employee morale low among field staff
 - a. Compensation and lack of support by management cited as main causes

Recommendations:

1. Establish training requirements and curriculum for various positions; link to evaluation process (SW)
2. Link evaluation process to project performance (SW)
3. Encourage and train Districts and Residencies to utilize flexibility of compensation tools available (SW)
4. Investigate whether additional title classifications warranted for Inspectors to reflect level of experience
5. Investigate methods to improve morale through compensation, training, team building, internal partnering, etc.

Observations and Recommendations (cont'd)

IX. Management Reporting

Observations:

1. Project reporting requirements not standardized
 - a. Resident Engineers each appear to be using their own off-line, spreadsheet reports to track Construction program status
2. Project Dashboard is informative and useful, however other information outside of Dashboard is needed to manage Projects
 - a. These additional management metrics should not be part of the Project Dashboard

Recommendations:

1. Develop standardized reporting templates to better assist accountable parties in managing both Projects and Program (SW)
 - a. Newly established Project Controls Office will be responsible for gathering required data and producing required management reports
2. Create project performance metrics to provide additional analysis (i.e. work order amounts as a percent of total contract value, contingency utilization, etc.) (SW)
 - a. New metrics are in addition to those currently being captured by the Project Dashboard

Observations and Recommendations (cont'd)

X. Project-Level Staffing

Observations:

1. VDOT Inspection Manual provides levels of inspection required for specific items of work
2. Hampton Roads currently at \$2.7M of construction per Inspector; NOVA \$4.6M per Inspector; Statewide average \$2.5M per Inspector
3. Hampton Roads currently at 3.2 Projects per Project Engineer; NOVA at 1 Project per PE; Statewide average 3.3 Projects per PE

Recommendations:

1. Perform spot checks to ensure that construction staff are utilizing the Inspection Manual (**SW**)
2. Inspection levels appear adequate at the present time; continue supplementing as needed with Consultant Inspectors
3. Investigate increasing number of Project Engineers in the District

Observations and Recommendations (cont'd)

XI. Construction Inspection

Observations:

1. Need improved and consistent compliance of the Inspector diaries to the requirements of Appendix C of the Construction Manual
 - a. Equipment and materials not being tracked properly
 - b. Difficult to track a pay item over time
2. Need more VDOT engineering presence in the field
 - a. A lack of adequate field staffing could result in Contractor's taking liberties and/or "cutting corners"
3. Formal mentoring program not existent

Recommendations:

1. Modify Inspector diary format to facilitate compliance with the requirements of Appendix C (SW)
 - a. Incorporate ability to track pay items over time to facilitate claim evaluation process
2. Assign staff based on education and qualification to increase skill and abilities of field staff
 - a. Ensure that appropriate construction management staff are spending sufficient amount of time in field
3. Develop formal mentoring program for field staff (SW)

Observations and Recommendations (cont'd)

XII. Project Documentation

Observations:

1. Standardized filing system not evident
2. Correspondence log, transmittal log, meeting minutes not consistently kept or included in Project Records
3. QA/QC of project documents not consistent

Recommendations:

1. Develop standard filing system for all projects **(SW)**
2. Formalize requirements for project documentation **(SW)**
3. Project Engineer should review files monthly to ensure completeness and accuracy

Observations and Recommendations (cont'd)

XIII. Quality Control and Safety

Observations:

1. Need to increase the number of CQIP program reviews to provide a true measurement of quality
 - a. Only 2 projects reviewed in the District this past fiscal year
2. No centralized function at District level for implementing Statewide quality initiatives and measuring compliance
3. Safety is emphasized through a centralized safety function at the Central Office and with regional engineers assigned to each District, however, safety could be further emphasized by designating a safety function at each District

Recommendations:

1. Increase number and frequency of CQIP reviews, including follow-up reviews to monitor correction of previously identified non-compliances (**SW**)
 - a. DCE to be responsible for ensuring that the appropriate corrective measures have been undertaken by the construction staff
2. DCE should review and determine need for establishing a centralized function for Construction Quality at the District level
3. DCE should review and determine need for a centralized function for Construction Safety at the District level

Observations and Recommendations (cont'd)

XIV. Contractor Evaluation Process

Observations:

1. Scores on C-36 form do not appear to reflect true assessment of contractor performance
2. Hampton Roads average C-36 score is 91.6, indicating high satisfaction with contractor performance

Recommendations:

1. Evaluate C-36 form to determine if it can better reflect Department's opinion of contractor performance (SW)
2. Provide additional guidance in completing C-36 evaluation (i.e. eliminate subjectivity, impact of personal relationships, etc.) (SW)

Conclusion

While the Study has yielded a number of observations and recommendations for a variety of topics, it is suggested that the Department initially focus on the following major modifications:

- 1. Redesign the Organization as proposed to:**
 - a. Streamline reporting lines**
 - b. Distribute authority for the successful delivery of the construction program to the appropriate parties**
 - c. Ensure that the necessary controls and oversight are in place within the District**
 - d. Encourage teamwork**
- 2. Implement a Project Management strategy that provides a seamless transition from design to construction and sufficient oversight and accountability at all stages of the project life cycle.**
- 3. Implement a Project Controls process to strengthen oversight of the construction program by consolidating and enhancing the District's estimating, schedule, work order review, contract administration and management reporting functions.**
- 4. Improve District communications internally and externally to ensure that roles and responsibilities are clearly understood and to facilitate the execution of the construction program.**